INSTALLATION, OPERATION AND MAINTENANCE MANUAL

EMI AMERICA SERIES MULTI-ZONE HEAT PUMP CONDENSING UNITS

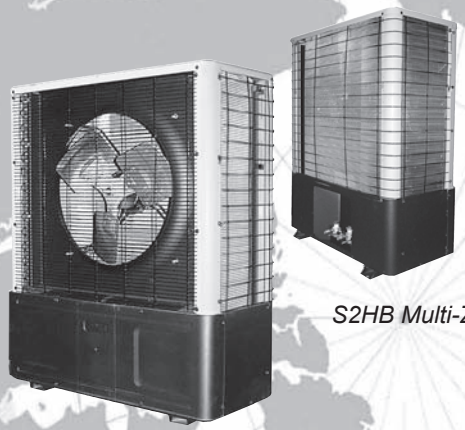
S2HB, T2HB, T3HB, AND T4HB HEAT PUMPS

Nominal Circuit Capacities:

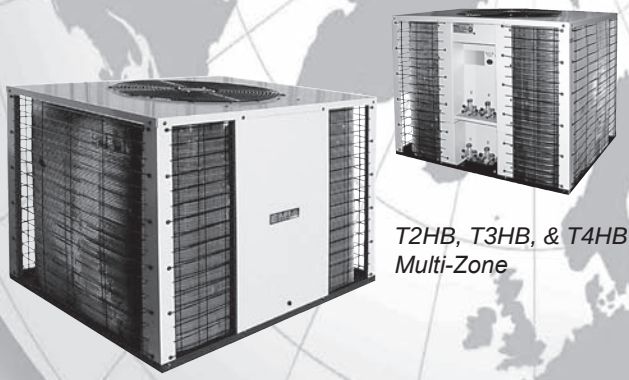
9,000 12,000 18,000 & 24,000 *Btuh units.*

EMI AmericaSeries

Comfort Where It Counts.



S2HB Multi-Zone



T2HB, T3HB, & T4HB Multi-Zone

Enviromaster International LLC
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Rome, NY 13440
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An ECR International Brand
An ISO 9001-2000 Certified Company

P/N# 240006458 Rev. B [10/08]

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

This manual is intended as an aid to qualified service personnel for proper installation, operation, and maintenance of these EMI America Series multi-zone heat pump condensing units. Read the instructions thoroughly and carefully before attempting installation or operation. Failure to follow these instructions may result in improper installation, operation, service, or maintenance, possibly resulting in fire, electrical shock, property damage, personal injury, or death.

Shipping Damage MUST be Reported to the Carrier IMMEDIATELY!!!
Examine the carton for signs of damage if any is evident open packaging and check the unit for shipping damage.

TO THE INSTALLER

(1) Retain this manual and warranty for future reference.

(2) Before leaving the premises, review this manual to be sure the unit has been installed correctly and run the unit for one complete cycle to make sure it functions properly.

To obtain technical service or warranty assistance during or after the installation of this unit, check our website @ www.enviromaster.com or call your installing contractor or distributor. Our technical service department may be contacted at 1-800-228-9364.

When calling for assistance, please have the following information ready:

• Model Number_____

• Serial Number_____

• Date of installation_____

⚠ DANGER ⚠

Tampering with the EMI America Series condenser is dangerous and may result in serious injury or death. Tampering voids all warranties. Do not attempt to modify or change this unit in any way.

SAFETY INSTRUCTIONS

- Read all instructions before using the EMI America Series multi-zone heat pump condenser. Install or locate this unit only in accordance with these instructions. Use this unit only for its intended use as described in this manual.
- Check the rating plate on the EMI America Series multi-zone heat pump condenser before installation to make certain the voltage shown is the same as the electric supply to the unit.
- The EMI America Series multi-zone heat pump condenser must be connected only to a properly grounded electrical supply. Do not fail to properly ground this unit.
- Turn off the electrical supply before servicing the EMI America Series multi-zone heat pump condenser.
- Do not use the EMI America Series multi-zone heat pump condenser if it has damaged wiring, is not working properly, or has been damaged or dropped.

[Save These Instructions]

Recognize this symbol as an indication of important safety information. ⚠ ⚠

DESCRIPTION

EMI offers the finest multi-zone heat pump outdoor units in the ductless split market, the S & T series (S2HB, T2HB, T3HB & T4HB) Condensing Units. The S & T series (S2HB, T2HB, T3HB & T4HB) allows the installation of two or more circuits from a single outside location when space or aesthetic requirements limit the use of the number of cabinets outdoors. Each zone is independent so no mixing of refrigerant occurs.

When specifying heat pump(s), it is recommended that the matching indoor unit(s) be equipped with electric heat. All 9,000, and 12,000 Btuh circuit units are equipped with the Duratec Performance Package which includes a large capacity suction accumulator with surge baffles and enhanced oil management, and a factory installed solid core filter drier. All 18,000 and 24,000 Btuh circuit units include a solid core filter drier and high pressure limit switch. The 18,000 Btuh circuits also include a large capacity suction accumulator with surge baffles and enhanced oil management.

NOTE: ***The crankcase heater is installed with 9,000 and 12,000 Btuh heat pumps.***

CONTROLS AND COMPONENTS *(FACTORY INSTALLED OR SUPPLIED)*

- Compressor and Fan Motor Contactor
- Capacitor
- Low Voltage Connections
- Large Capacity Suction Accumulator (9, 12, & 18 Only)
- High Pressure Control *(18 & 24 Only)*
- Solid Core Filter Drier
- Thermostatically controlled crankcase heater *(9&12 Only)*
- Common suction pressure access point
- Hard Start Capacitor

Thermostatically controlled crankcase heater *– This feature energizes the crankcase heater only when needed, removes the heater from the electrical circuit at conditions where it's not required, saving unnecessary Watts, and increasing overall system efficiency.*

SYSTEM OPTIONS

- Sea Coast Style Coated Coils / Copper-Copper coils
- Wind Baffles - Louvers

INSTALLER SUPPLIED ITEMS

- Power wiring
- Low Volt wiring - 18 AWG minimum
- Secure mounting pad or foundation
- Refrigerant piping
- Disconnect switch

ITEMS FOR CONSIDERATION

- Locate the unit as close to the indoor section as possible. Maximum length allowed is 100 equivalent feet.
- Avoid high traffic areas and prevailing wind locations.
- Surface must be level.
- Mount unit above typical snow levels.

Ensure free air flow through the unit. Air must not recirculate from discharge to intake. Air is drawn through the coil with side or top and discharged through the fan grille. ***A minimum 48" clearance is necessary for the condenser discharge. Intake (coil side) clearance is 12" minimum.*** Consider how power will be run to the unit from the power source. Refrigerant piping must be a direct line to the indoor unit.

Heat pump units produce condensate in the heat pump mode. Water will drain from the unit at the base. Place the unit so as not to create a hazard for pedestrians.

SITE PREPARATION

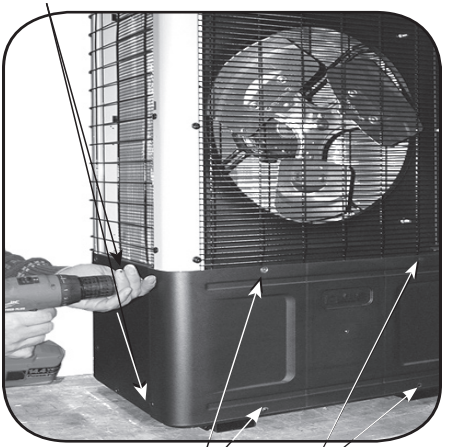
Place the unit on a flat concrete surface or pad if on the ground. Roof mounting should use a build up platform. Piping is through the wall or roof directly to the unit. In areas of heavy snowfall, condensers should be set above the level of maximum anticipated snowfall (12" is usually adequate).

NOTE: ***For T2HB, T3HB, & T4HB installation refer to the T2HB, T3HB, & T4HB Installation Instruction section in this manual.***

S2HB UNIT MOUNTING SECTION

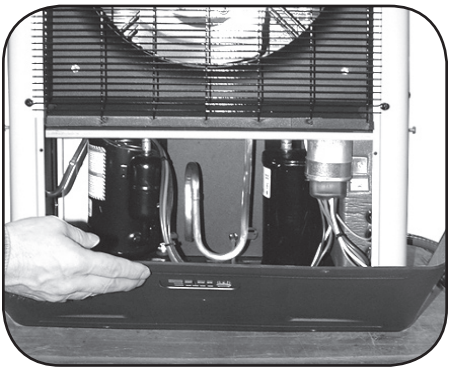
Side discharge unit allows for permanent mounting through the feet. ***This is highly recommended due to the vertical design of the unit***.

1. Loosen the screws on left and right sides of the front panel. *(Do not remove these screws.)*

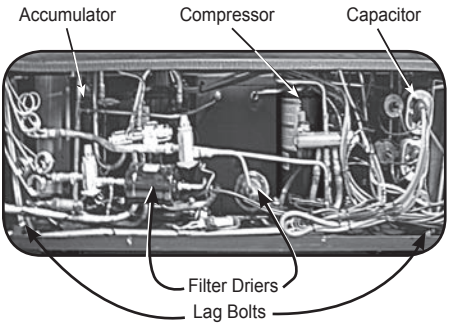


2. Remove the screws on the front of the panel.

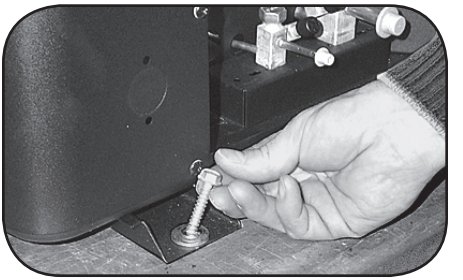
3. To remove front panel:



4. Slide front panel forward to clear side screws and remove.



5. Insert lag bolts through the holes in the bottom of the unit and tighten to secure.



6. Insert lag bolts through the holes in the feet on the back of the unit and tighten to secure.

7. Replace the front panel, ***do not*** tighten the side screws at this time.

⚠ DANGER ⚠

The EMI America Series condensing unit must:

- Be connected to a properly grounded electrical supply with the proper voltage as stated on the rating plate.
- Have proper over current protection (i.e. time- delay fuse/HACR-Breaker) as listed on the Rating Plate.

Failure to follow these instructions can result in a fire, explosion, or electrical shock causing property damage, personal injury, or death.

⚠ DANGER ⚠

Do not use the EMI America Series condensing unit with any electrical supply voltage other than the one listed on the rating plate.

Check the rating plate on the unit for the correct voltage rating. Failure to use the correct voltage may result in death, serious bodily injury or property damage. If you have any questions or doubts, consult the factory before installing this unit.

1. All electrical wiring must be run according to NEC and local codes.
2. Refer to the unit rating plate for voltage, minimum circuit ampacity and over current protection requirements.

3. Use only HACR type breakers or time delay fuses. Select the wire size according to the ampacity rating.
4. To access electrical connections and wiring diagram:

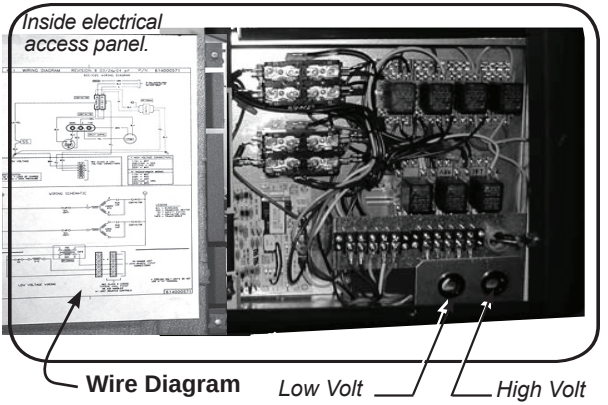
   a) Remove the screws on the side panel adjacent to the back panel.
   b) The screws adjacent to the front panel should already be loose (don't remove them).

   c. Slide the side panel out to access the high/low electrical connections and wire diagram.

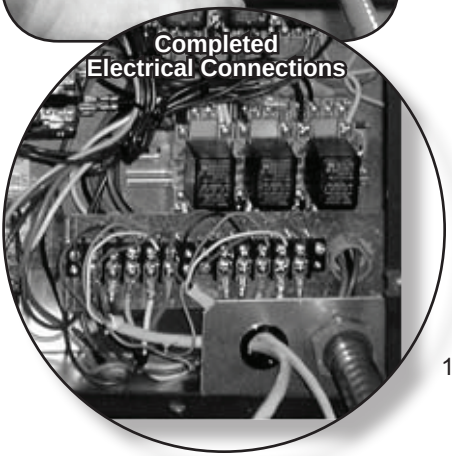
Note: *Remove the plastic edge guards from the holes and replace with a watertight strain relief fitting (High V) and a split grommet fitting (Low V)*

5. Power should be run to a weather proof disconnect box usually within 3 feet of the unit.
6. From the disconnect box, run the power through the 7/8" hole on the side of the unit and into the electrical box and anchor with the strain relief fitting.
7. Run wires to the high Volt pigtail in the control box and attach L1 and L2 connections. Also run green wire to ground wire.

Note: *Refer to the units' wiring diagram for all wiring.*

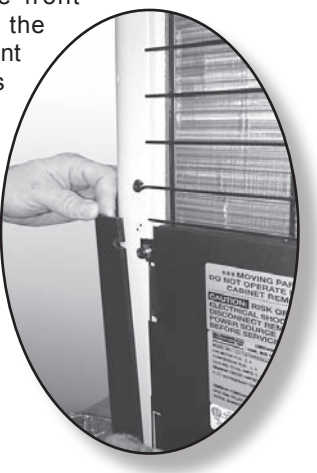


8. Check wiring diagram for the required number of low voltage wires to be run between indoor and outdoor sections.



9. Connect the 24 Volt wiring matching color to color. Refer to the wiring diagram on the inside panel of the condenser, and also refer to the wiring diagram on the indoor unit. Low Volt interconnect should be at least 18 AWG.

10. To replace side panel slide the slotted holes of the panel onto the loosened screws of the front panel so that the edge of the front panel covers the edge of the side panel.

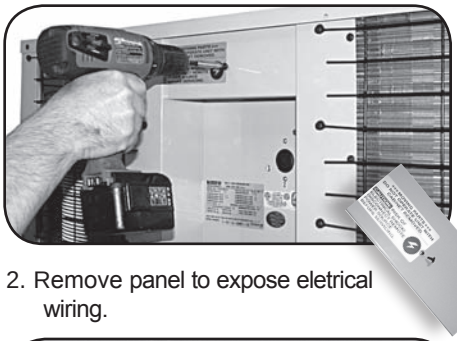


11. Tighten all remaining loose screws.

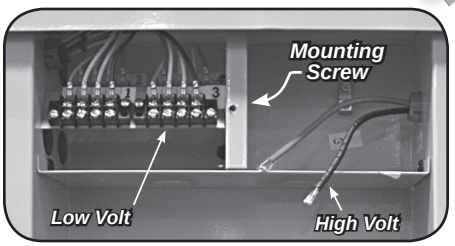
NOTE: ***For S2HB installation refer to the S2HB Installation Instruction in this manual.***

After the T2HB, T3HB, or T4HB unit is positioned on the concrete slab or platform (refer to the ***Site Preparation*** in the front of this manual) the T2HB, T3HB, or T4HB is ready for installation:

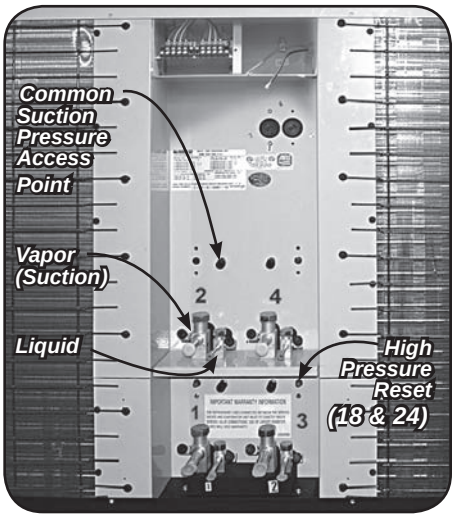
1. Remove the screw on the back panel.



2. Remove panel to expose eletrical wiring.

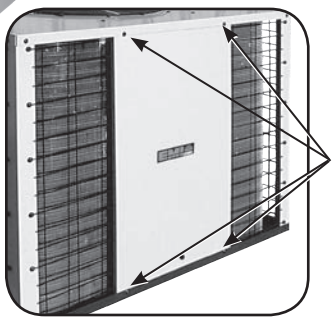


3. Location of electrical and tubing connections on back of unit.



ELECTRICAL WIRING

1. All electrical wiring must be run according to NEC and local codes.
2. Refer to the unit rating plate for voltage, minimum circuit ampacity and over current protection requirements.
3. Use only HACR type breakers or time delay fuses. Select the wire size according to the ampacity rating.

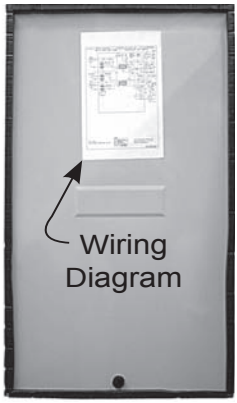


Remove the four screws on the front panel

4. To access wiring diagram:

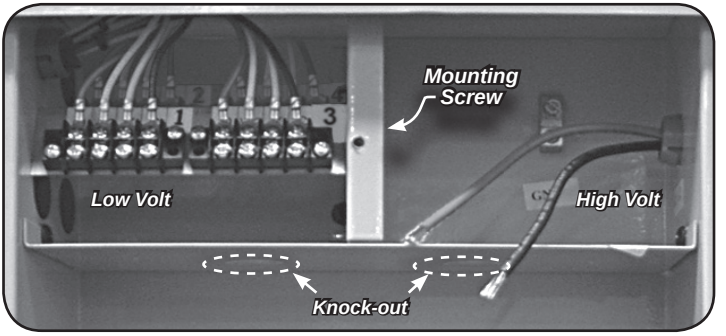
   a) Remove the four screws on the front panel of the unit and slide the panel down until the upper edge is free, then remove the panel.

   b) The wiring diagram is located on the inside of the front panel.



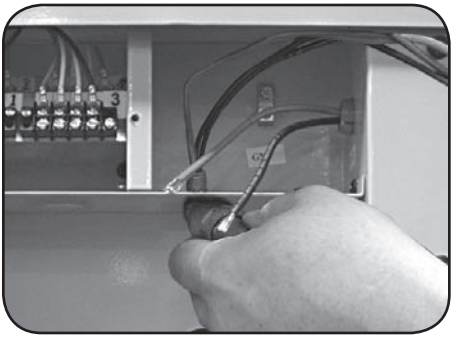
ELECTRICAL WIRING

5. With a screwdriver punch out and remove the knock-outs in the low & high Volt electrical connection box.



Note: *Power should be run to a weather proof disconnect box usually within 3 feet of the unit.*

6. From the disconnect box feed the high Volt wires through a weather proof conduit and run the power through the 7/8" hole (from knock-out) in the unit's electrical box. Anchor with a strain relief fitting. Refer to the wiring diagram.



7. Following the wiring diagram, run wires to the High Volt pigtail in the control box and attach L1 and L2 connections. Also run green wire to ground lug.

8. Check wiring diagram for the required number of low voltage wires to be run between indoor and outdoor sections.

9. Connect the 24 Volt wiring matching color to terminal block designation for each zone as labeled. Refer to the wiring diagram on the inside front panel of the condenser, and also refer to the wiring diagram on the indoor unit. Low Volt interconnect should be at least 18 AWG.

When connecting to the rear terminal strip there are two approaches.

a) Using a long straight screw driver over the top of the front terminal strip while holding the wire with needle nose pliers from below.

b) Remove the mounting screw (stubby screwdriver), then pull the entire front terminal strip forward, disengaging the tab on left from slot. When finished, reinsert terminal strip tab into slot and reinstall mounting screw.

⚠ CAUTION ⚠

Make sure that Low Volt wiring for each circuit is connected to the matching Low Volt wiring.

10. Replace the unit's electric box cover and the front panel and tighten screws.

NOTE: ***Refrigerant Piping Installation for all of the multi-zone heat pump models.***

INTERCONNECTING TUBING SPECS *S2HB, T2HB, T3HB, & T4HB models:*				
Nominal Circuit Capacity	Maximum Length	Maximum Lift	Liquid Line OD	Suction Line OD
9,000	100'	35'	1/4"	1/2"
12,000	100'	35'	1/4"	1/2"
18,000	100'	35'	3/8"	5/8"*
24,000	100'	35'	3/8"	3/4"

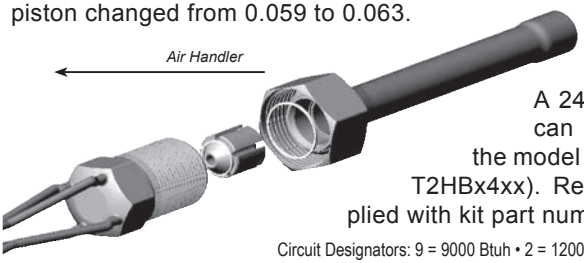
** CAH24, UNH24, WLH24 Suction Connection size is 3/4" O.D. and must bush down to 5/8" for 18,000 Btuh circuits at the indoor unit.*

The system will support refrigerant runs to the inside unit of up to 100' equivalent feet with a 35' rise included. The units are furnished with sweat connections and are equipped with refrigerant valves and Schrader fittings for charging and taking pressure readings. The following precautions should be made:

- Be certain no burrs remain on the fittings.
- Use only clean refrigeration tubing.
- Use tube benders to guard against kinking.
- Avoid piping on wet and rainy days and ***insulate suction line***. Be certain that plastic end caps remain in place when inserting through wall openings. Isolate tubing from transmitting vibration to the building or unit and avoid contact with sharp edges. **Refrigeration valves should be wrapped with a wet rag "heat sink" to protect valves while brazing.**

PISTON/ORIFICE CHANGE KIT INSTALLATION

When a WLH24 or UNH24 air handler is matched with a T2HB or T3HB containing a 24,000 Btuh nominal capacity circuit, the air handler must have it's stock piston changed from 0.059 to 0.063.



A 24,000 Btuh nominal circuit can be identified by the "4" in the model number capacity field (i.e. T2HBx4xx). Refer to the instructions supplied with kit part number; 240006777.

Circuit Designators: 9 = 9000 Btuh • 2 = 12000 Btuh • 8 = 18000 Btuh • 4 = 24000 Btuh
(ex. - 8400 consists of one 18000 Btuh compressor and one 24000 Btuh compressor)

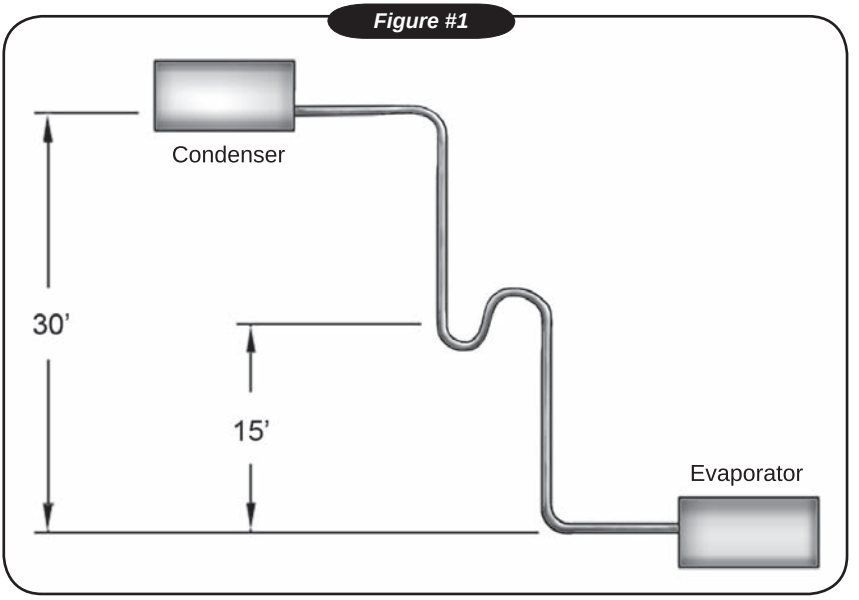
Model # Air Handler	Condenser Btuh	Factory Installed Piston/Orifice Size	Field Changeover Piston/Orifice Size
WLH24 or UNH24	T2HB2400 T2HB8400 T2HB4400 T3HB9940 T3HB9240 T3HB2240	.059"	.063"

Note: *This kit is only supplied with the above Heat Pump models.*

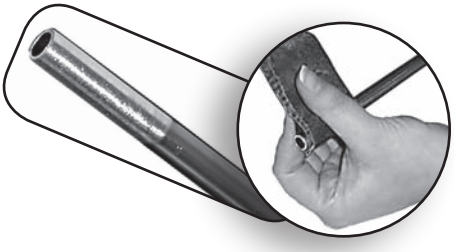
- A P-trap is recommended when the suction riser is equal to or greater than 20 feet in height.
- When the condenser is installed above the evaporator, the P-trap will help the return of oil back to the compressor.
- The placement of the P-trap should be at the halfway mark of the suction riser. For example if the suction riser is 30 feet tall then a P-trap is recommended at the 15 foot mark of the suction riser (see ***Figure #1***).
- A P-trap may be fabricated using;

  (2) street elbows and (2) regular elbows. A prefabricated trap may be purchased from a Wholesaler or Distributor however the trap should be shallow as the: (4) elbow configuration. Each elbow is approximately 2 equivalent feet. One P-trap is equal to approximately 8 equivalent feet.

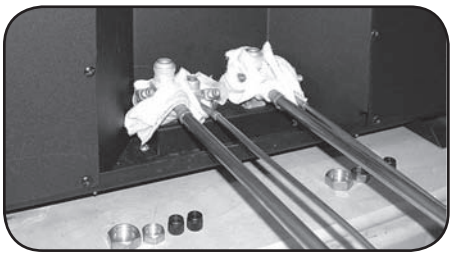
Figure #1



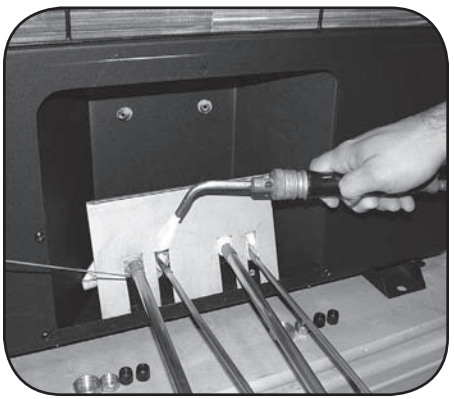
1. Clean the ends of tubing and insert into fittings.



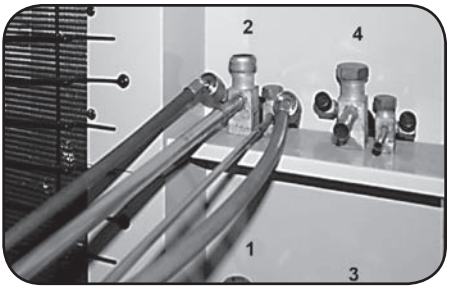
2. Protect the valves by wrapping with a wet rag "heat sink" before brazing.



3. The use of a shield is recommend (one can be made from some scrap metal) to protect the paint.



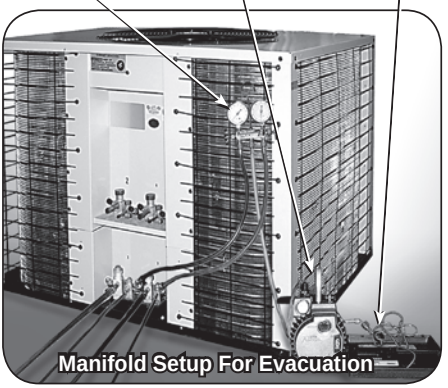
4. Braze tubing into fittings.



5. Verify that the correct piston for the system match is in place, refer to the air handler Installation Instructions.

6. Refer to the indoor air handler Installation Instructions for any specific details regarding the connection of tubing. Connect and braze tubing into the indoor air handler.

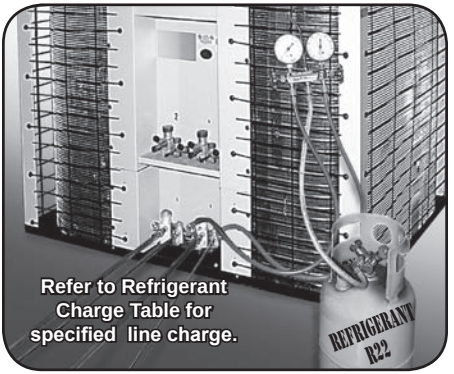
7. Attach manifold set.



8. Evacuate line to 500 microns or less to ensure all moisture has been removed and there are no leaks.

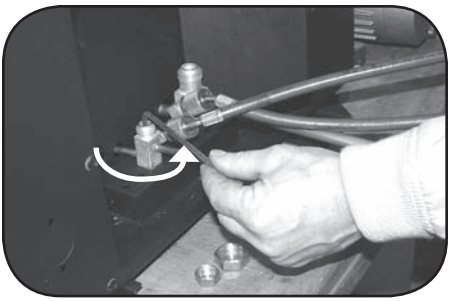
⚠ WARNING ⚠

It is illegal to discharge refrigerant into the atmosphere. Use proper reclaiming methods & equipment when installing or servicing this unit.

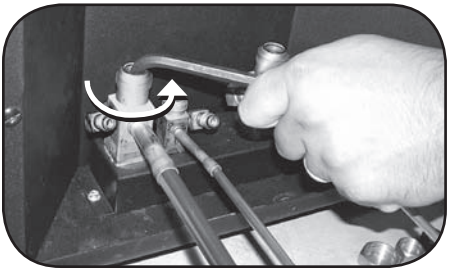


Note: *Charging should be done with a dial-a-charge or weighed in with a scale.*

9. Once certain of a good evacuation and leak free joints, back-seat the valves (counter-clockwise) to open and allow factory charge to fill lines and indoor unit.
10. Charge to proper weight, charge based on feet of interconnect (table on next page)



11. Refer to *Field Charging Charts* to "fine tune" the refrigerant charge to meet your conditions.



The units are delivered pre-charged with refrigerant for the condenser coil and the evaporator. Charging of the field installed piping is required. Refer to the refrigerant charge table for the proper amount to be added for the applications interconnect piping. Unit service valves are solid brass, for sweat connections.

IMPORTANT: All systems require field charge adjustments. Refer to the "Refrigerant Charge Tables" for proper weight charge and to the supplied "Field Charging Charts" for proper system pressures and temperature at different outdoor conditions. Superheat should be used for final system charge in cooling mode. Subcool should be used for final system charge in heating mode.

RECAP OF COMPLETING PIPING CONNECTIONS

Pressure test all field installed piping and the indoor air handler with nitrogen. Using a suitable vacuum pump, evacuate the tubing and indoor unit to 500 microns or less, with service values remaining front seated (closed).

Before releasing the refrigerant from the condenser, be sure the manifold gauge set is closed so as not to lose vacuum when shutting down the pump.

Release refrigerant from the condensing unit by back seating the service value. Allen wrenches are used to open the valve. Replace valve caps. Be careful to not back seat the valves past the snap flanges that hold the valve core in place.

MULTI-ZONE HEAT PUMP REFRIGERANT CHARGE TABLE						
Circuit Capacity Btuh	Evaporator Pairing	Line Chg/ft	Line Length	Line Adjust	Factory Charge	Total Charge
9000	WLH09 CAH12 UNH09	0.25 oz	10 ft 25 ft 50 ft	3 oz 6 oz 13 oz	42	45 oz 48 oz 55 oz
12000	WLH12 CAH12 UNH12	0.25 oz	10 ft 25 ft 50 ft	3 oz 6 oz 13 oz	46	49 oz 52 oz 59 oz
18000	WLH24 CAH24 UNH24	0.56 oz	10 ft 25 ft 50 ft **	6 oz 14 oz 28 oz **	63	86 oz 94 oz 108 oz
24000	WLH24 CAH24 UNH24	0.56 oz	10 ft 25 ft 50 ft	6 oz 14 oz 28 oz	80	86 oz 94 oz 108 oz

*** Any 18,000 Btuh circuit with more than 87 feet of tubing (> 112 oz of total refrigerant charge) requires a 25W wrap around Crankcase Heater.*

IMPORTANT NOTES:

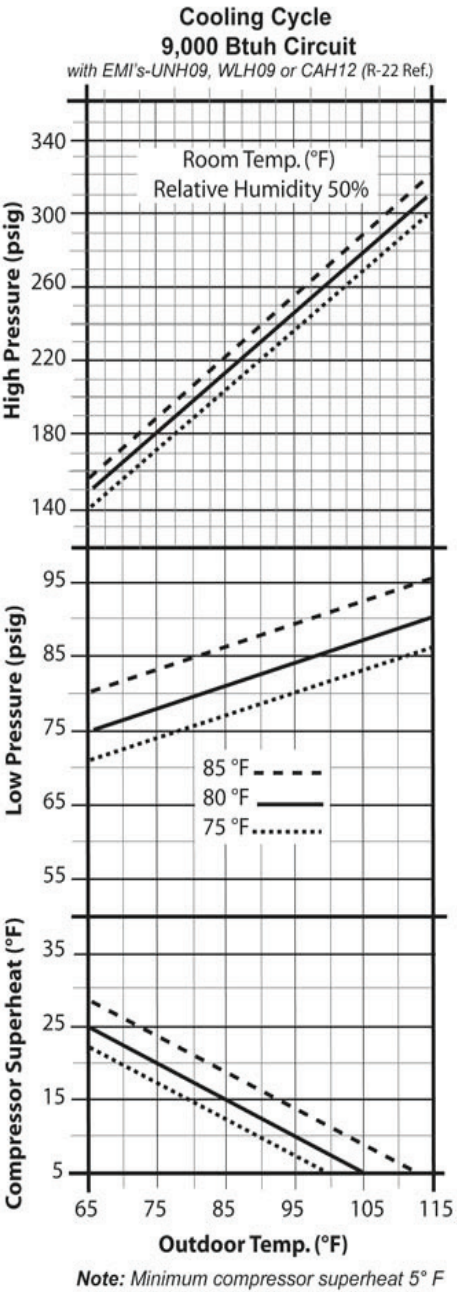
1. To find the charge adjustment and system charge for any evaporator and tubing length:
   Line Adjustment = (Line Chg/Ft) x Line Length
   System Total = Factory Charge + Line Adjustment
2. Round to the nearest ounce and allow for gauges and hoses.
3. Use R22 refrigerant.

FIELD CHARGING

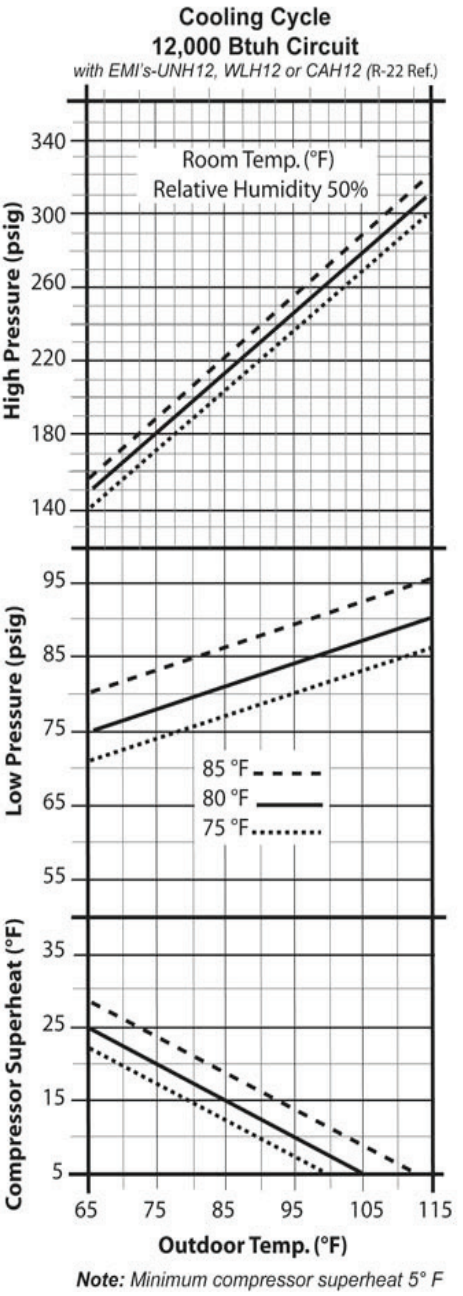
The use of the superheat method is highly recommended for field charging or checking the existing refrigerant charge in a system. Because each installation is different in terms of indoor air flow, refrigerant line length, etc.., the factory charge may not be correct for every application. To assure the best performance from the air-conditioner, the refrigerant charge should be checked and adjusted, if need be, on each installation.

For proper superheat readings, a standard low-side refrigerant gauge and an accurate thermometer are needed. A mercury or stem-type thermometer is not adequate for suction-line temperatures. We recommend electric thermocouple thermometers (available at most refrigeration wholesalers); however an accurate remote-bulb thermometer can be used. When measuring the line temperature, be sure the thermometer is well insulated to assure accurate measurements. The chart below gives superheat values at various outdoor temperatures. Allow at least 5 minutes running time between charge adjustments for the unit to stabilize.

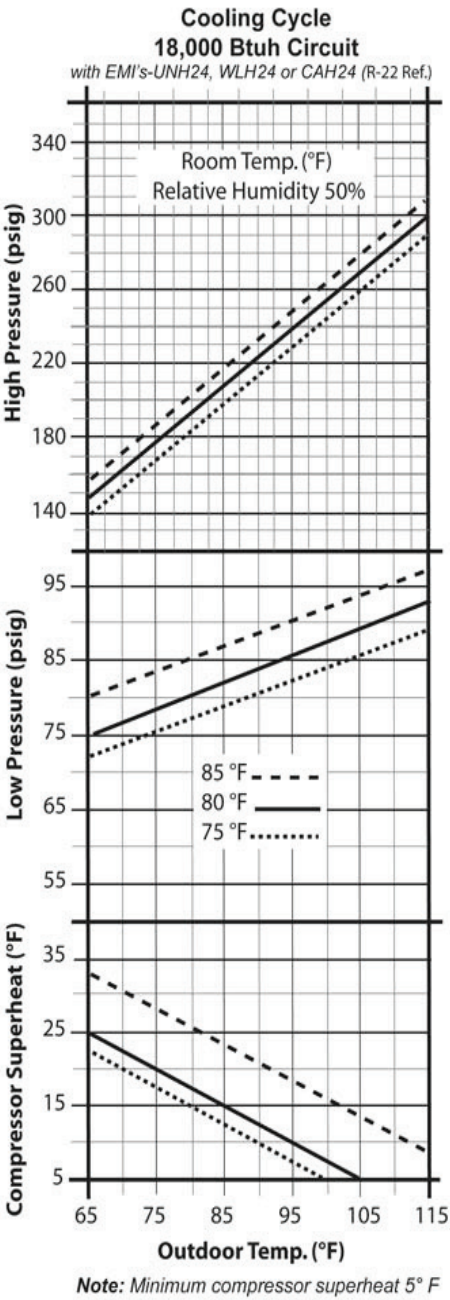
The S & T series (S2HB, T2HB, T3HB & T4HB) have manifold access points on each of the service valves for the high and low pressures in cooling mode. There is an additional “common suction” access point above each service valve set to provide low pressure access in the heating mode as both service valves are at high side pressure.



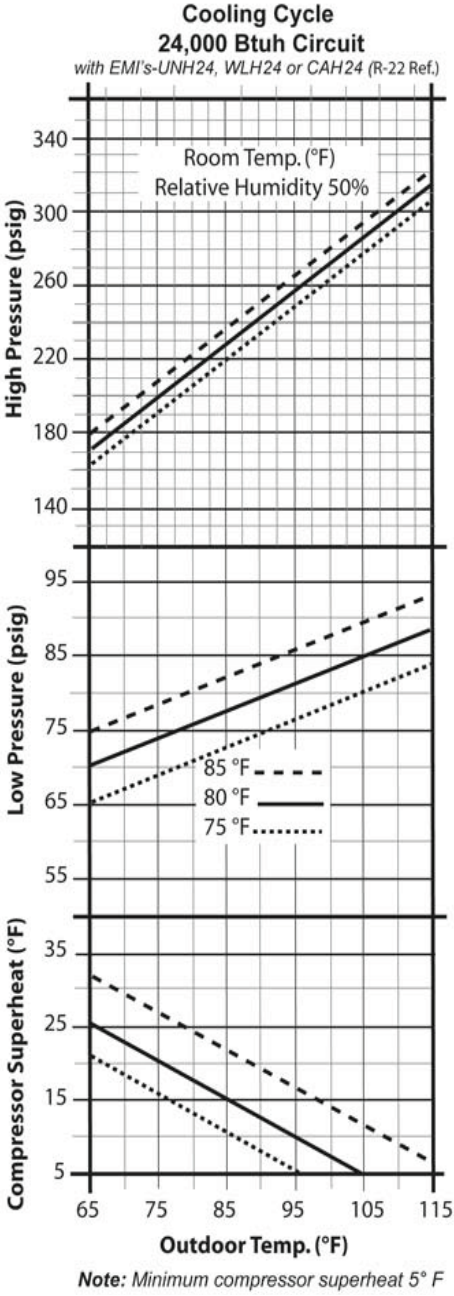
Note: *Minimum compressor superheat 5° F*



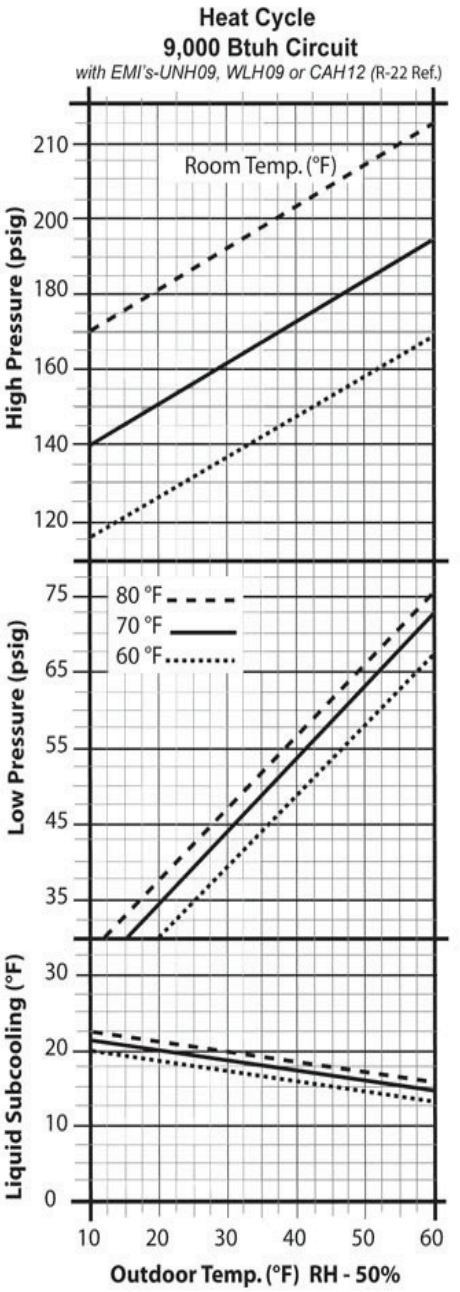
Note: *Minimum compressor superheat 5° F*

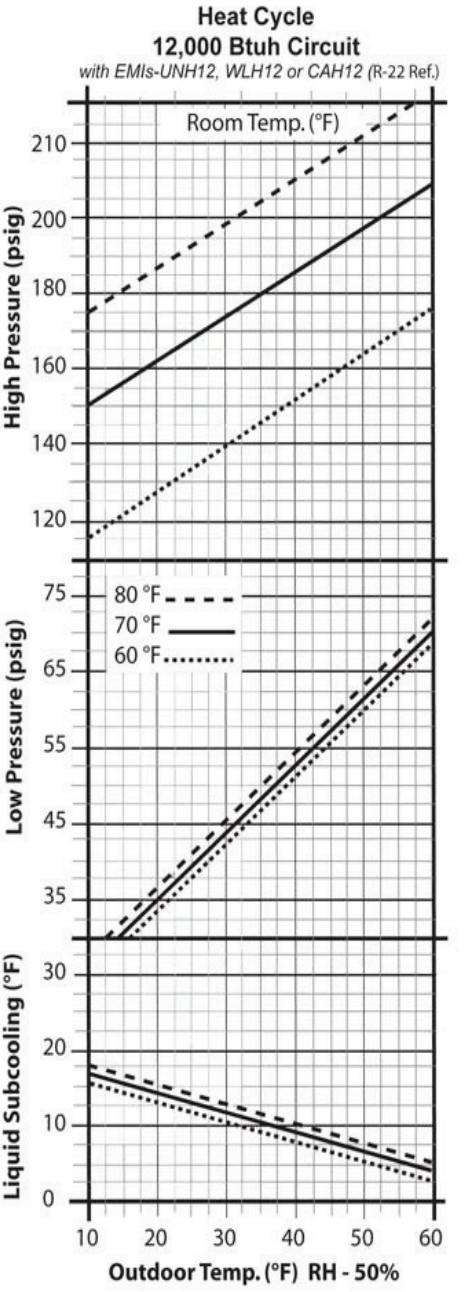


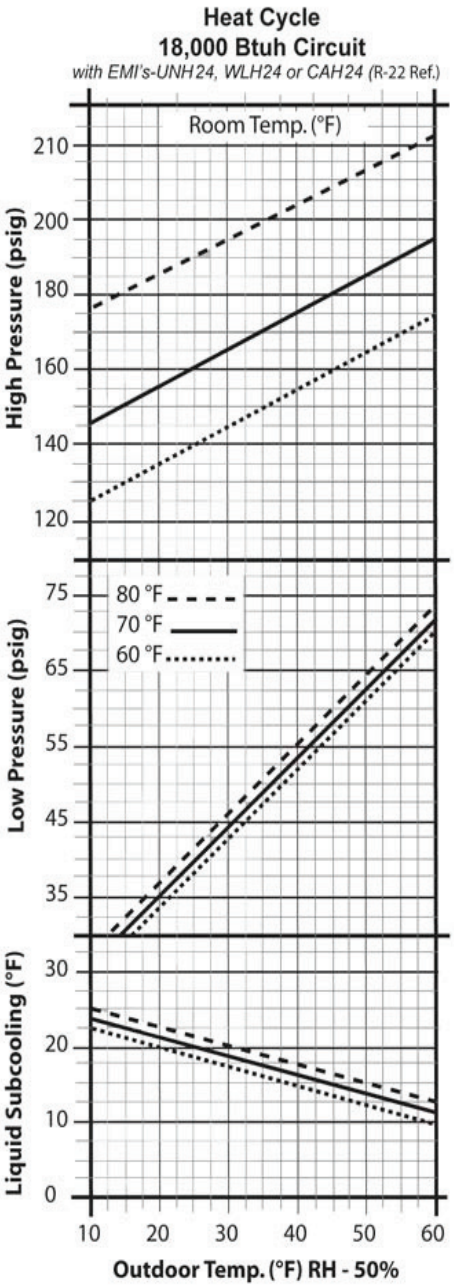
Note: *Minimum compressor superheat 5° F*

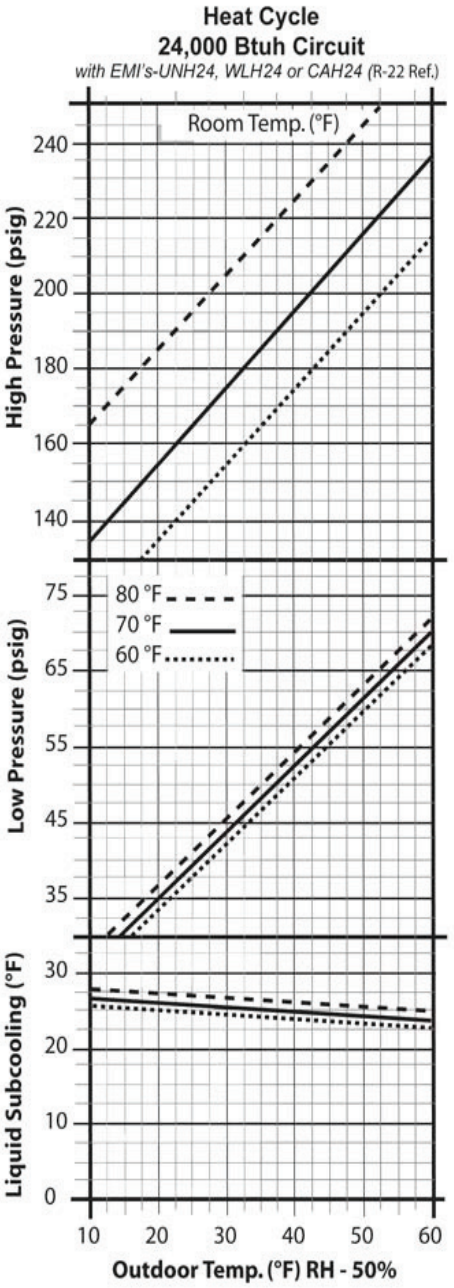


Note: *Minimum compressor superheat 5° F*


Heat Cycle
9,000 Btuh Circuit
with EMI's-UNH09, WLH09 or CAH12 (R-22 Ref.)
Room Temp. (°F)
High Pressure (psig)
210
200
180
160
140
120
80 °F
70 °F
60 °F
Low Pressure (psig)
75
65
55
45
35
Liquid Subcooling (°F)
30
20
10
0
10
20
30
40
50
60
Outdoor Temp. (°F) RH - 50%


Heat Cycle
12,000 Btuh Circuit
with EMIs-UNH12, WLH12 or CAH12 (R-22 Ref.)
Room Temp. (°F)
High Pressure (psig)
210
200
180
160
140
120
80 °F
70 °F
60 °F
Low Pressure (psig)
75
65
55
45
35
Liquid Subcooling (°F)
30
20
10
0
10
20
30
40
50
60
Outdoor Temp. (°F) RH - 50%


Heat Cycle
18,000 Btuh Circuit
with EMI's-UNH24, WLH24 or CAH24 (R-22 Ref.)
Room Temp. (°F)
High Pressure (psig)
210
200
180
160
140
120
Low Pressure (psig)
75
65
55
45
35
80 °F
70 °F
60 °F
Liquid Subcooling (°F)
30
20
10
0
10
20
30
40
50
60
Outdoor Temp. (°F) RH - 50%


Heat Cycle
24,000 Btuh Circuit
with EMI's-UNH24, WLH24 or CAH24 (R-22 Ref.)
Room Temp. (°F)
High Pressure (psig)
240
220
200
180
160
140
Low Pressure (psig)
75
65
55
45
35
80 °F
70 °F
60 °F
Liquid Subcooling (°F)
30
20
10
0
10
20
30
40
50
60
Outdoor Temp. (°F) RH - 50%

FIELD CHARGING

NOTE: *If operating superheat is more than 5°F above the chart value, add refrigerant. If below the chart value remove refrigerant. If below the limit line, remove refrigerant.*

Example *(Using the 12,000 Btuh cooling chart):*

1. Suction pressure is 65 psi. which equals 38° F on ***The R-22 Scale of the Low-Side Gauge.***
2. Suction line temperature taken at the unit is 70° F. 70° F minus 38° F equals 32° F superheat.
3. Outdoor temperature is 90° F, indoor temperature is 80° F.
4. Intersection of the indoor-temperature and outdoor-temperature lines occur on the 12° F superheat line.
5. Add charge to obtain 12° F superheat.

Instructions:

1. Measure suction pressure and determine evaporator-refrigerant temperature on R-22 scale of low-side gauge.
2. Measure suction-line temperature on suction line of the unit.
3. Measure outdoor and indoor temperatures.
4. Determine from the table what the superheat should be for the indoor and outdoor temperatures. (Example indicates 12° F superheat.)
5. Adjust charge if needed. Be sure unit is running at stabilized condition.

NOTE: *For installation of the indoor unit and start-up of the system, please refer to the appropriate installation manual for your indoor product to complete the installation.*

STARTING THE UNIT

- Before starting the unit in cool weather, power the system 24 hours before attempting to start.
- Do a final system check using the superheat/subcooling method. Record results on ***Test Unit Performance Data*** sheet *(next page)*.

  - Cooling mode superheat is set with a proper sized piston and charge, using the field charging charts.

  - Heating mode superheat is set with a TXV and should be 5 -10°F. When charging a system in heat mode, use the subcool method field charging charts.

- Remove gauge set. Mount all access panels and make sure they are properly secured.
- Make final visual inspection and repair any deficiencies.

(Proceed to the ***Sequence Of Operation*** *on the following pages)*

The Test Unit Performance Data sheet below is provided for use by a qualified service professional. In order for our Technical Service Department to better serve you, please complete and have this information ready when calling. Make sure to include the Model Number, Serial Number, Date of Installation.

Call our Technical Support Department @ 1-800-228-9364.

Test Unit Performance Data			
		Date:	
Model Number		Technician:	
Serial Number		Mode:	Cooling
Indoor Section		**Notes**	
Evaporator Entering Air - DB			
Evaporator Entering Air - WB			
Evaporator Leaving Air - DB			
Evaporator Leaving Air - WB			
Outdoor Section			
Entering Air			
Leaving Air			
Temperature Split			
Operating Pressures			
Compressor Suction - PSIG			
Compressor Discharge - PSIG			
Power Input			
Compressor - Volts			
Compressor - Amps			
OD Fan Motor - Volts			
OD Fan Motor - Amps			
ID Fan Motor - Volts			
ID Fan Motor - Amps			
Total Volts			
Total Amps			
Temperatures - Degrees F°			
Compressor Suction			
Compressor Discharge			
Liquid Out Cond.			
Liquid before Expansion			
Suction out Evaporator			
Capacity Calculations			
DB - Temp Split at evap.			

Note: *Rotary compressors are critically charged systems, do not over charge. Refer to the Charge Table specific to the unit being installed or call the factory. Anti-short cycle protection should be used on systems that use a conventional thermostat.*

Test Summary	
Compressor Superheat	
Sub Cooling	

Save this information for future servicing. In the event there is a problem with the unit. Perform the test again (if possible) and have both sets of data ready when calling for assistance.

▲▼ EMI America Series multi-zone heat pump condensers are designed to operate with EMI America Series indoor air handlers. Both the condenser *(outdoor unit)* and evaporator *(indoor unit)* have a high Volt service connection. Each is to be independently connected to the electrical service panel. *(See the unit name plate for the correct breaker type and size)*. The outdoor and indoor units are also connected to each other through a low Volt interconnect wiring. A 24V transformer located in the indoor unit provides the low Volt power source.

The S & T series (S2HB, T2HB, T3HB & T4HB) heat pumps will provide comfort cooling or heat pump operation operate at an outdoor temperature range between 35°F and 115°F for cooling, 0°F and 75°F for *(heat pump)* heating.
The S & T series (S2HB, T2HB, T3HB & T4HB) heat pump condensers are designed to operate as a single stage cooling, two stage heating unit. For full operation the unit should be matched with an appropriate EMI indoor unit with electric heat and unit mounted controls or a wall mounted thermostat.

For two stage heating operation the indoor unit must be equipped with an electric strip heater.

See the instruction manual for the indoor unit on the selection of the proper thermostat for the system.

▲▼Condenser Operation:
The transformer located in the indoor unit provides 24V, low-Volt control power to the condenser *(outdoor unit)*. This can be measured across low-Volt terminals “R” and “C”.

Heat pump condensers utilize a reversing valve to provide reverse cycle operation. Therefore the outdoor unit will act as either a condenser or an evaporator thereby providing comfort cooling or heating to the indoor space. The reversing valve is energized in cooling. Should the valve fail to actuate, the system will default to the heating mode of operation.

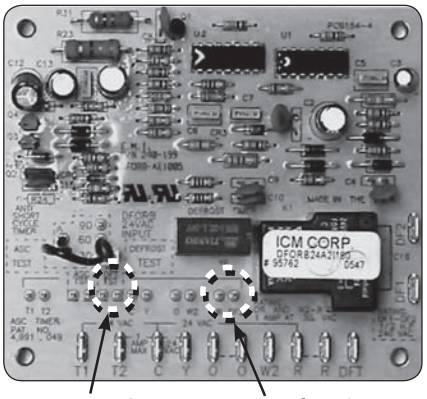
▲▼ Cooling operation, Multi-zone Heat Pump:
Cooling mode operation requires that the control (either unit mount or remote wall mount thermostat) make a connection between low-Volt terminals “R” and “Y” along with “R” and “O”. When the indoor control is placed in cooling mode, with the set point temperature below the room temperature, the reversing valve will energize *(R & O)* along with the compressor and outdoor fan *(R & Y)*. When the indoor control is satisfied and the room temperature falls below the set temperature, the compressor and fan will de-energize. The EMI indoor unit is equipped with an anti-short cycle timer *(ASCT)* will prevent the compressor from re-starting for three minutes.

▲▼ Heating operation, Multi-zone Heat Pump:
Heating mode operation requires that the control (either unit mount or remote wall mount thermostat) make a connection between low-Volt terminals “R” and “Y” only. When the indoor control is placed in heating mode, with the set point temperature above room temperature, the compressor and outdoor fan *(R & Y)* will energize. When the indoor control is satisfied and the room temperature rises above the set temperature, the compressor and fan will de-energize. The EMI indoor unit is equipped with an anti-short cycle timer *(ASCT)* will prevent the compressor from re-starting for three minutes.

Note: *For full operation the indoor unit must have an electric heater.*

TESTING DEFROST OPERATION USING TEST PINS

DEFROST CONTROL



WARNING!

Before removing the access panels to the unit make sure that all power is disconnected from the unit. Failure to do so could result in injury or electric shock.

Defrost operation can be initiated using the test pins located on the circuit board of the condensing unit. "Defrost test operation" will be a time compressed version of the actual defrost cycle.

With the system "off", using two small alligator clips, jumper the following sets of test pins. *"R and DF2" and "DFT TST".*

Defrost control board: Apply power to the indoor and outdoor units. Place the indoor unit in heating mode with the set point temperature well above room temperature. This is to ensure that the condenser will remain on during the entire defrost test operation.

The condenser will operate in heating for approximately 20 seconds. At that point the unit will enter defrost mode for approximately 2 seconds. During this time the condenser fan will switch off, the reversing valve will energize and the defrost board will energize the indoor electric heat relay through the "W" terminal. After the two second defrost cycle is complete, the unit will switch back to heating operation for another 20 seconds. This process will repeat until the jumpers are removed from the test pins.

Note: If the condenser coil is heavily frosted up with ice, it is likely that the "Defrost Sensor" is already closed. In this case the "R and DFT" jumper can be eliminated. To initiate defrost, momentarily jump pins marked "DFT TST" until the defrost cycle begins. The unit will remain in defrost mode until the condenser coil is defrosted and then it will return to heating mode. When testing is complete be sure to remove the jumper(s). DO NOT leave the unit in test mode with jumper(s) in place.

Defrost controls with short cycle protection *(heat pumps only):* The unit is equipped with a logic control circuit designed to keep system operating at peek efficiency. The 24V circuit provides control to the indoor and outdoor systems including a three minute, anti-short cycle timer (ASCT) compressor protection.

The defrost control circuit is designed to keep the condenser coil free from frost and ice during heating mode. This is accomplished through the precise switching sequence of the outdoor fan, reversing valve and indoor auxiliary heater.

Defrost initiation: The defrost-sensor is located on either the end plate or the return bend of the condenser coil. A defrost cycle will initiate after the sensor closes (approx. 30° F) and remains closed for the length of time selected on the control board (either 30, 60 or 90 minutes)*.

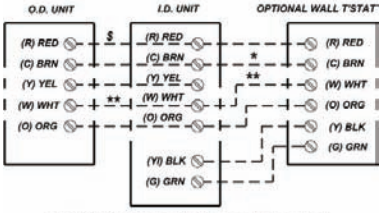
At the start of the defrost cycle, the reversing valve will change from heating to cooling mode. The condenser fan will also switch off, there-by allowing pressure and temperature to rise within the condenser

coil, melting off any ice build-up. At the same time the unit will switch on the indoor electric strip heater to temper the cold air being discharged from the evaporator unit. This will continue until either the defrost-sensor opens (approx. 60° F) or a 10-minute maximum cycle time has elapsed. Defrost times will vary depending on outdoor temperature and moisture conditions. When the defrost cycle is complete the unit will return to normal heating operation.

Factory settings 9-24k Btu = 90 minutes

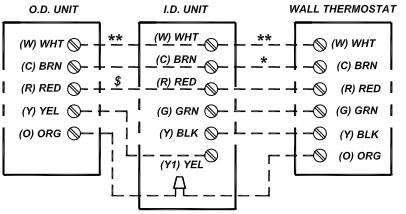
LOW VOLT INTERCONNECT DIAGRAMS

UNH Universal Air Handler, WLH Wall Unit & CAHB Cassette Heat Pump Applications



* - Some thermostats do not use a "C" terminal
** - Electric heat option
$ - "R" Connection for S1H Single Zone only

CAHA Cassette Heat Pump Applications



* - Some thermostats do not use a "C" terminal
** - Electric heat option
$ - "R" Connection for S1H Single Zone only

Refer to the indoor unit for the proper low Volt interconnect wiring.

OPERATION AND MAINTENANCE

The EMI America Series outdoor section is the compressor bearing unit of the system. It operates at the command of the indoor section or room thermostat. Therefore, the operation will be described in the manual pertaining to the indoor section.

EMI units are designed and constructed for reliability and long life with minimal maintenance. You can assure peak operating efficiency by regularly inspecting for free air passage into and through the coil. If debris collect on the air coil, it should be cleaned by "back-flushing" with a spray of water or vacuuming. **TURN OFF POWER SUPPLY FIRST.** Outdoor units may be cleaned or waxed if desired. Use a non-abrasive car wax.

Panels should remain on the unit at all times. Service should be performed by a *QUALIFIED* service agency only.

SPECIFIC CHANGES

All EMI products are subject to ongoing development programs so design and specifications may change without notice. Please consult the factory for more information.

GENERAL RECOMMENDATIONS

Do not charge the **straight cool** units on cold days unless weighing in the charge. The **heat pump** systems may be charged in heat cycle between 35 and 75°F. **These units use a heat cycle TXV and cannot be charged to superheat; use weight or subcooling method only.**

Charging should be done with a dial-a-charge or weighed in with a scale.

***NOTE:** For more information, please visit our web-site at www.enviromaster.com or call 1-800-228-9364.*

S2HB DIMENSIONS AND SPECIFICATIONS

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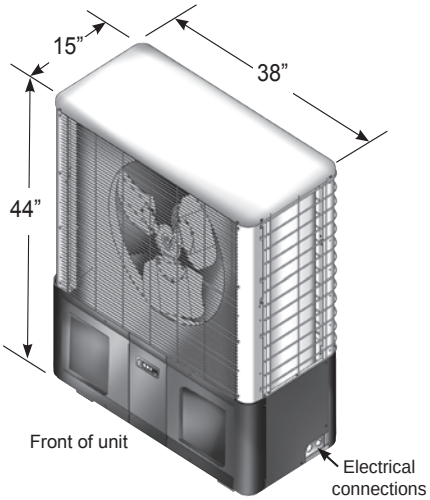
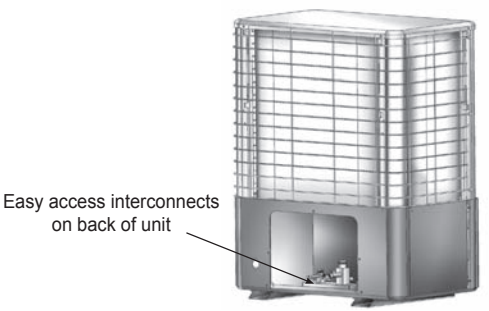
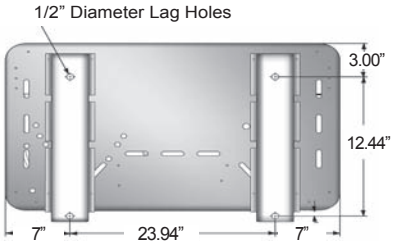


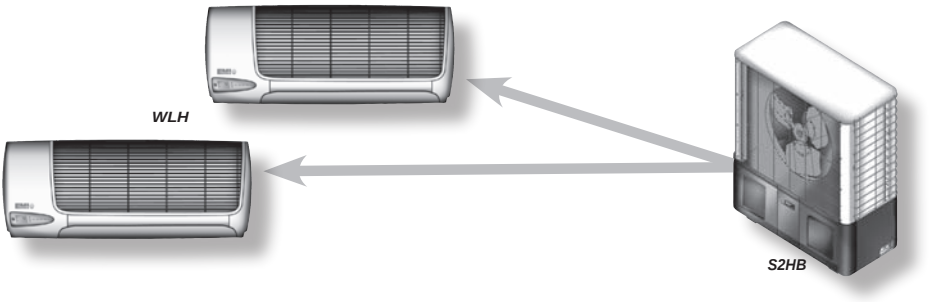




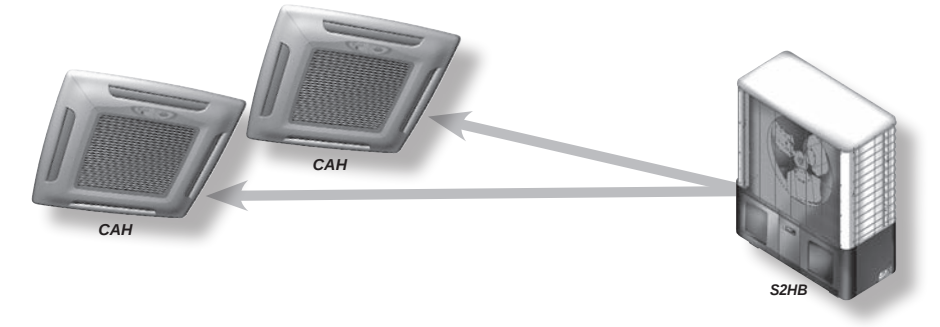
S2HB ELECTRICAL SPECIFICATIONS										
MODEL (1)	VOLTS/HZ/PHASE	FAN		COMPRESSOR 1		COMPRESSOR 2		TOTAL AMPS	MIN. CIR. AMPS (2)	HACR BRKR
		RLA	HP	RLA	LRA	RLA	LRA			
9900	208-230/60/1	1.8	0.33	3.4	23	3.4	23	8.6	9.5	15
2200	208-230/60/1	1.8	0.33	4.3	27	4.3	27	10.4	11.5	15
9200	208-230/60/1	1.8	0.33	3.4	23	4.3	27	9.5	10.6	15

(1) Circuit Designators: 9 = 9,000 Btuh • 2 = 12,000 Btuh (ex. - Model 9200 consists of one 9,000 Btuh compressor and one 12,000 Btuh compressor)
(2) Always refer to the rating plate for Minimum Circuit Ampacity on all multiple compressor units.

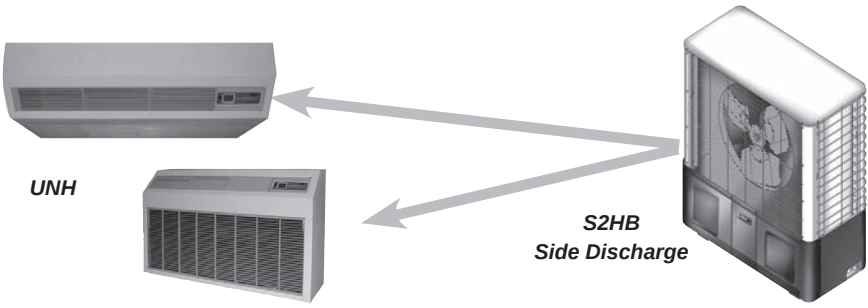
S2HB PIPING SPECIFICATIONS			SOUND DATA	SHIPPING WEIGHT
Model#	Line Sizes			
	Liquid	Suction	dBA	Lbs.
9900	1/4”	1/2”	64	159
2200	1/4”	1/2”	65	197
9200	1/4”	1/2”	65	187



S2HB / WLH SYSTEM PERFORMANCE								
MODEL		COOLING				HEATING		
S2HB (Outdoor)	Indoor Units	Btuh	SEER	SHR	EER	Btuh	HSPF	C.O.P.
9900	WLH09 + WLH09	18,600	13.0	.80	11.9	14,800	7.7	3.3
2200	WLH12 + WLH12	22,600	13.0	.72	11.7	18,400	7.7	3.3
9200	WLH09 + WLH12	20,600	13.0	.76	11.7	16,600	7.7	3.3

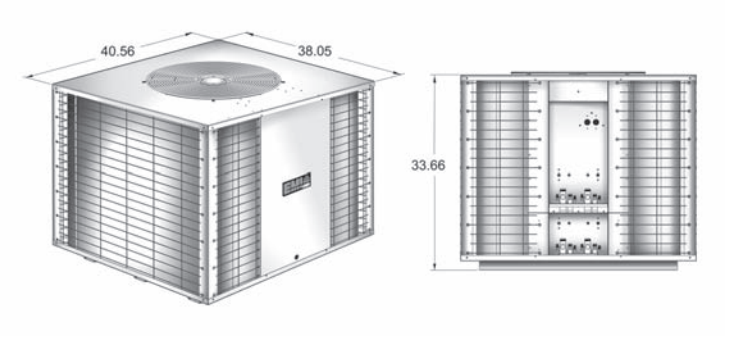


S2HB / CAH SYSTEM PERFORMANCE								
MODEL		COOLING				HEATING		
S2HB (Outdoor)	Indoor Units	Btuh	SEER	SHR	EER	Btuh	HSPF	C.O.P.
9900	CAH12 + CAH12	18,600	13.0	79	11.4	14,600	7.7	3.1
2200	CAH12 + CAH12	22,600	13.0	.75	11.3	18,400	7.7	3.2
9200	CAH12 + CAH12	20,600	13.0	.77	11.3	16,500	7.7	3.1



S2HB / UNH SIDE DISCHARGE								
MODEL		COOLING				HEATING		
S2HB (Outdoor)	Indoor Units	Btuh	SEER	SHR	EER	Btuh	HSPF	C.O.P.
9900	UNH09 + UNH09	18,600	13.0	.75	11.9	14,800	7.7	3.3
2200	UNH12 + UNH12	22,600	13.0	.73	11.7	18,400	7.7	3.3
9200	UNH09 + UNH12	20,600	13.0	.74	11.7	16,600	7.7	3.3

NOTE: *All EMI products are subject to ongoing development programs so design and specifications may change without notice.*



LINE SET, SOUND & WEIGHT DATA				
Model	Line Set Diameters		Sound	Weight
	Liquid	Suction	dBA	Lbs.
T2HB8800	3/8”	5/8”	70	325
T2HB8400	3/8”	5/8” & 3/4”	70	325
T2HB4400	3/8”	3/4”	70	325
T2HB2400	1/4” & 3/8”	1/2” & 3/4”	70	325
T2HB9800	1/4” & 3/8”	1/2” & 5/8”	70	325
T3HB9990	1/4”	1/2”	70	325
T3HB9920	1/4”	1/2”	70	325
T3HB9980	1/4” & 3/8”	1/2” & 5/8”	70	325
T3HB9940	1/4” & 3/8”	1/2” & 3/4”	70	325
T3HB9220	1/4”	1/2”	70	325
T3HB9280	1/4” & 3/8”	1/2” & 5/8”	70	325
T3HB9240	1/4” & 3/8”	1/2” & 3/4”	70	325
T3HB2280	1/4” & 3/8”	1/2” & 5/8”	70	325
T3HB2240	1/4” & 3/8”	1/2” & 3/4”	70	325
T3HB2220	1/4”	1/2”	70	325
T4HB9999	1/4”	1/2”	70	325
T4HB9992	1/4”	1/2”	70	325
T4HB9922	1/4”	1/2”	70	325
T4HB9222	1/4”	1/2”	70	325
T4HB2222	1/4”	1/2”	70	325

NOTE: *All EMI products are subject to ongoing development programs so design and specifications may change without notice.*

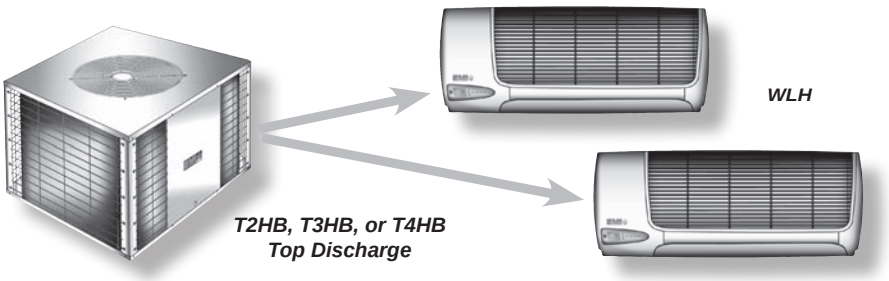
INTERCONNECTING TUBING SPECS *T2HB, T3HB, & T4HB models:*				
Nominal Circuit Capacity	Maximum Length	Maximum Lift	Liquid Line OD	Suction Line OD
9,000	100'	35'	1/4"	1/2"
12,000	100'	35'	1/4"	1/2"
18,000	100'	35'	3/8"	5/8"*
24,000	100'	35'	3/8"	3/4"

** CAH24, UNH24, WLH24 Suction Connection size is 3/4" O.D. and must bush down to 5/8" for 18,000 Btuh circuits at the indoor unit.*

ELECTRICAL SPECIFICATIONS • T2HB, T3HB, AND T4HB - 208/230V - 60 HERTZ 1 - PHASE

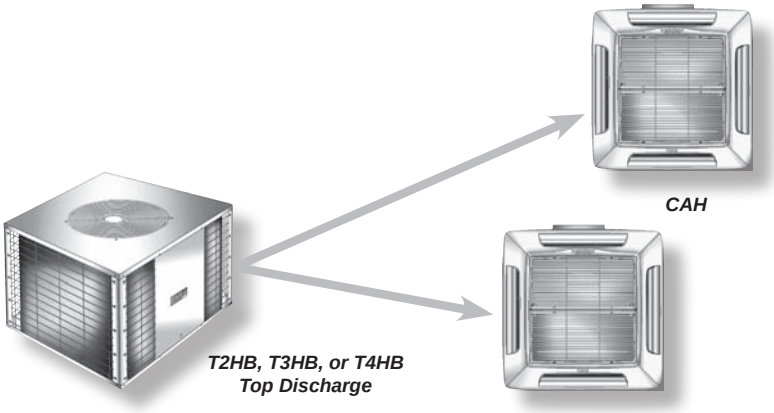
CAPACITY	FAN MTR		COMPRESSOR								TOTAL AMPS	MCA	HACR BRKR	MIN VOLT
	AMPS	HP	CIRCUIT #1		CIRCUIT #2		CIRCUIT #3		CIRCUIT #4					
			RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA				
T2HB														
8800	1.8	0.33	5.4	36	5.4	36	–	–	–	–	12.6	14.0	15	197
8400	1.8	0.33	5.4	36	8.8	54	–	–	–	–	16.0	18.2	25	197
4400	1.8	0.33	8.8	54	8.8	54	–	–	–	–	19.4	21.6	30	197
2400	1.8	0.33	4.3	27	8.8	54	–	–	–	–	14.9	17.1	25	197
9800	1.8	0.33	3.4	23	5.4	36	–	–	–	–	10.6	12.0	15	197
T3HB														
9990	1.8	0.33	3.4	23	3.4	23	3.4	23	–	–	12.0	13.0	15	197
9920	1.8	0.33	3.4	23	3.4	23	4.3	27	–	–	12.9	14	15	197
9980	1.8	0.33	3.4	23	3.4	23	5.4	36	–	–	14	15.4	20	197
9940	1.8	0.33	3.4	23	3.4	23	8.8	54	–	–	17.4	19.6	25	197
9220	1.8	0.33	3.4	23	4.3	27	4.3	27	–	–	13.8	14.9	15	197
9280	1.8	0.33	3.4	23	4.3	27	5.4	36	–	–	14.9	16.3	20	197
9240	1.8	0.33	3.4	23	4.3	27	8.8	54	–	–	18.3	20.5	25	197
2280	1.8	0.33	4.3	27	4.3	27	5.4	36	–	–	15.8	17.2	20	197
2240	1.8	0.33	4.3	27	4.3	27	8.8	54	–	–	19.2	21.4	30	197
2220	1.8	0.33	4.3	27	4.3	27	4.3	27	–	–	14.7	15.8	20	197
T4HB														
9999	1.8	0.33	3.4	23	3.4	23	3.4	23	3.4	23	15.4	16.3	20	197
9992	1.8	0.33	3.4	23	3.4	23	3.4	23	4.3	27	16.3	17.4	20	197
9922	1.8	0.33	3.4	23	3.4	23	4.3	27	4.3	27	17.2	18.3	20	197
9222	1.8	0.33	3.4	23	4.3	27	4.3	27	4.3	27	18.1	19.2	20	197
2222	1.8	0.33	4.3	27	4.3	27	4.3	27	4.3	27	19	20.1	25	197

Circuit Designators: 9 = 9000 Btuh 2 = 12000 Btuh 8 = 18000 Btuh 4 = 24000 Btuh *(ex. - 8400 consists of one 18000 Btuh compressor and one 24000 Btuh compressor)*



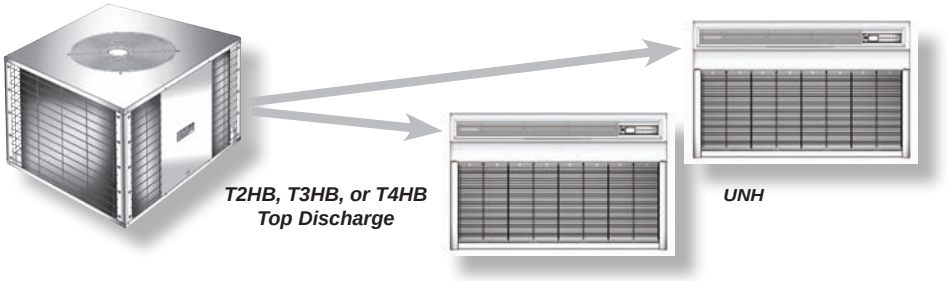
WLH / T2HB, T3HB, OR T4HB SYSTEM PERFORMANCE DATA								
Model		Cooling				Heating		
Outdoor	Indoor Air Handler	Btuh	SEER	SHR	EER	Btuh	HSPF	COP
T2HB8800	(2) WLH24	36000	13	0.72	12.1	26800	7.7	3.3
T2HB8400	(2) WLH24	42000	13	0.68	11.9	32000	7.7	3.2
T2HB4400	(2) WLH24	48000	13	0.65	11.8	37400	7.7	3.2
T2HB2400	(1) WLH12 + (1) WLH24	35000	13	0.67	11.7	27800	7.7	3.2
T2HB9800	(1) WLH09 & (1) WLH24	27200	13	0.74	12.0	20800	7.7	3.3
T3HB9990	(3) WLH09	27800	13	0.80	11.9	22200	7.7	3.3
T3HB9920	(2) WLH09 + (1) WLH12	29800	13	0.76	11.8	24000	7.7	3.3
T3HB9980	(2) WLH09 + (1) WLH24	36400	13	0.76	12.0	28200	7.7	3.3
T3HB9940	(2) WLH09 + (1) WLH24	42500	13	0.71	11.8	33400	7.7	3.2
T3HB9220	(1) WLH09 + (2) WLH12	31800	13	0.74	11.7	25800	7.7	3.3
T3HB9280	(1) WLH09 + (1) WLH12 + (1) WLH24	38500	13	0.73	11.9	30000	7.7	3.3
T3HB9240	(1) WLH09 + (1) WLH12 + (1) WLH24	44500	13	0.69	11.7	35200	7.7	3.2
T3HB2280	(2) WLH12 + (1) WLH24	40500	13	0.76	11.8	31800	7.7	3.3
T3HB2240	(2) WLH12 + (1) WLH24	46500	13	0.68	11.7	37000	7.7	3.2
T3HB2220	(3) WLH12	34000	13	0.72	11.7	27600	7.7	3.3
T4HB9999	(4) WLH09	37200	13	0.8	11.9	29600	7.7	3.3
T4HB9992	(3) WLH09 + (1) WLH12	39000	13	0.77	11.8	31400	7.7	3.3
T4HB9922	(2) WLH09 + (2) WLH12	41000	13	0.76	11.8	33200	7.7	3.3
T4HB9222	(1) WLH09 + (3) WLH12	43000	13	0.72	11.6	35000	7.7	3.3
T4HB2222	(4) WLH12	45000	13	0.72	11.7	36800	7.7	3.3

Circuit Designators: 9 = 9000 Btuh 2 = 12000 Btuh 8 = 18000 Btuh 4 = 24000 Btuh *(ex. - 8400 consists of one 18000 Btuh compressor and one 24000 Btuh compressor)*



CAH / T2HB, T3HB, OR T4HB SYSTEM PERFORMANCE DATA								
Model		Cooling				Heating		
Outdoor	Indoor Air Handler	Btuh	SEER	SHR	EER	Btuh	HSPF	COP
T2HB8800	(2) CAH24	36000	13	0.75	12.3	24400	7.7	3.1
T2HB8400	(2) CAH24	42000	13	0.71	12.1	30600	7.7	3.1
T2HB4400	(2) CAH24	48000	13	0.67	11.7	36800	7.7	3.1
T2HB2400	(1) CAH12 + (1) CAH24	35000	13	0.69	11.5	27600	7.7	3.1
T2HB9800	(1) CAH12 & (1) CAH24	27200	13	0.76	11.9	19400	7.7	3.1
T3HB9990	(3) CAH12	27800	13	0.80	11.6	21800	7.7	3.2
T3HB9920	(3) CAH12	29800	13	0.78	11.4	23800	7.7	3.1
T3HB9980	(2) CAH12 + (1) CAH24	36400	13	0.77	11.9	26800	7.7	3.1
T3HB9940	(2) CAH12 + (1) CAH24	42500	13	0.72	11.6	33000	7.7	3.1
T3HB9220	(3) CAH12	31800	13	0.76	11.3	25600	7.7	3.1
T3HB9280	(2) CAH12 + (1) CAH24	38500	13	0.75	11.8	28600	7.7	3.1
T3HB9240	(2) CAH12 + (1) CAH24	44500	13	0.71	11.8	34800	7.7	3.1
T3HB2280	(2) CAH12 + (1) CAH24	40500	13	0.75	11.7	30400	7.7	3.1
T3HB2240	(2) CAH12 + (1) CAH24	46500	13	0.71	11.5	36800	7.7	3.1
T3HB2220	(3) CAH12	34000	13	0.75	11.3	27600	7.7	3.1
T4HB9999	(4) CAH12	37200	13	0.8	11.6	29200	7.7	3.2
T4HB9992	(4) CAH12	39000	13	0.78	11.5	31000	7.7	3.1
T4HB9922	(4) CAH12	41000	13	0.77	11.4	33000	7.7	3.1
T4HB9222	(4) CAH12	43000	13	0.75	11.2	34800	7.7	3.1
T4HB2222	(4) CAH12	45000	13	0.75	11.3	36800	7.7	3.1

Circuit Designators: 9 = 9000 Btuh 2 = 12000 Btuh 8 = 18000 Btuh 4 = 24000 Btuh *(ex. - 8400 consists of one 18000 Btuh compressor and one 24000 Btuh compressor)*



UNH / T2HB, T3HB, OR T4HB SYSTEM PERFORMANCE DATA								
Model		Cooling				Heating		
Outdoor	Indoor Air Handler	Btuh	SEER	SHR	EER	Btuh	HSPF	COP
T2HB8800	(2) UNH24	36000	13	0.72	12.1	26800	7.7	3.3
T2HB8400	(2) UNH24	42000	13	0.68	11.9	32000	7.7	3.2
T2HB4400	(2) UNH24	48000	13	0.65	11.8	37400	7.7	3.2
T2HB2400	(1) UNH12 + (1) UNH24	35000	13	0.67	11.7	27800	7.7	3.2
T2HB9800	(1) UNH09 + (1) UNH24	27200	13	0.74	12.0	20800	7.7	3.3
T3HB9990	(3) UNH09	27800	13	0.80	11.9	22200	7.7	3.3
T3HB9920	(2) UNH09 + (1) UNH12	29800	13	0.76	11.8	24000	7.7	3.3
T3HB9980	(2) UNH09 + (1) UNH24	36400	13	0.76	12.0	27200	7.7	3.3
T3HB9940	(2) UNH09 + (1) UNH24	42500	13	0.71	11.8	33400	7.7	3.2
T3HB9220	(1) UNH09 + (2) UNH12	31800	13	0.74	11.7	25800	7.7	3.3
T3HB9280	(1) UNH09 + (1) UNH12 + (1) UNH24	38500	13	0.73	11.9	30000	7.7	3.3
T3HB9240	(1) UNH09 + (1) UNH12 + (1) UNH24	44500	13	0.69	11.7	35200	7.7	3.2
T3HB2280	(2) UNH12 + (1) UNH24	40500	13	0.76	11.8	31800	7.7	3.3
T3HB2240	(2) UNH12 + (1) UNH24	46500	13	0.68	11.7	37000	7.7	3.2
T3HB2220	(3) UNH12	34000	13	0.72	11.7	27600	7.7	3.3
T4HB9999	(4) UNH09	37200	13	0.8	11.9	29600	7.7	3.3
T4HB9992	(3) UNH09 + (1) UNH12	39000	13	0.77	11.8	31400	7.7	3.3
T4HB9922	(2) UNH09 + (2) UNH12	41000	13	0.76	11.8	33200	7.7	3.3
T4HB9222	(1) UNH09 + (3) UNH12	43000	13	0.72	11.6	35000	7.7	3.3
T4HB2222	(4) UNH12	45000	13	0.72	11.7	36800	7.7	3.3

Circuit Designators: 9 = 9000 Btuh 2 = 12000 Btuh 8 = 18000 Btuh 4 = 24000 Btuh *(ex. - 8400 consists of one 18000 Btuh compressor and one 24000 Btuh compressor)*

EVAPORATORS

WLC/WLH
High Wall Evaporator

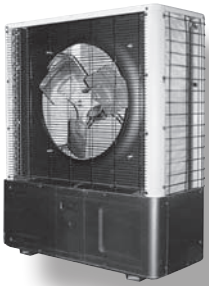
CAC/CAH
Cassette Evaporator

UNC/UNH
Universal Evaporator

CONDENSERS

S1C & S1H
Single Zone
Side Discharge

S2C & S2H
Dual Zone
Side Discharge



T2C, T3C & T4C
T2H, T3H & T4H
2, 3, & 4 Zone
Top Discharge